

What is claimed is:

1           1.     An array of resilient solder bonding structures, each one  
2 comprising a solder ball having a curved exterior surface enclosing a first  
3 volume and having an interior cavity having a displacement constituting a  
4 second volume, the solder ball connecting at least one metal contact on a first  
5 surface to at least one metal contact on a second surface.

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1           2.     The array of resilient solder bonding structures as claimed in  
2 claim 1, wherein the second volume is not less than about 1% of the first  
3 volume.

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1           3.     The array of resilient solder bonding structures as claimed in  
2 claim 1, wherein the second volume is not more than about 90% of the first  
3 volume.

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1           4.     A resilient ball grid array (BGA) electrical and mechanical  
2 attachment means for attaching an integrated circuit to a planar substrate,  
3 comprising a plurality of solder ball structures, each solder ball structure  
4 having a curved exterior surface enclosing a first volume and having an  
5 interior cavity having a displacement constituting a second volume, each  
6 solder ball structure attaching one of a plurality of first metal contacts on the

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7 integrated circuit to an associated one of a plurality of second metal contacts  
8 on the planar substrate.

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1 5. The resilient BGA attachment means as claimed in claim 1,  
2 wherein the second volume is not less than about 1% of the first volume.

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1 6. The resilient BGA attachment means as claimed in claim 1,  
2 wherein the second volume is not more than about 90% of the first volume.

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1 7. A resilient ball grid array (BGA) electrical and mechanical  
2 attachment means for attaching an integrated circuit to a printed circuit board,  
3 comprising a plurality of solder ball structures, each solder ball structure  
4 having a curved exterior surface enclosing a first volume and having an  
5 interior cavity having a displacement constituting a second volume, each  
6 solder ball structure attaching one of a plurality of first metal contacts on the  
7 integrated circuit to an associated one of a plurality of second metal contacts  
8 on the printed circuit board.

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1 8. The resilient ball grid array (BGA) electrical and mechanical  
2 attachment means as claimed in claim 7, wherein a substrate of the printed  
3 circuit board is made of organic materials.

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1           9.     The resilient ball grid array (BGA) electrical and mechanical  
2 attachment means as claimed in claim 7, wherein a substrate of the printed  
3 circuit board is made of inorganic materials.

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1           10.    The resilient ball grid array (BGA) electrical and mechanical  
2 attachment means as claimed in claim 7, wherein the second volume is not  
3 less than about 1% of the first volume

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1           11.    The resilient ball grid array (BGA) electrical and mechanical  
2 attachment means as claimed in claim 7, wherein the second volume is not  
3 more than about 90% of the first volume.

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1           12.    A resilient ball grid array (BGA) electrical and mechanical  
2 attachment means for attaching a first planar substrate to a second planar  
3 substrate, comprising a plurality of solder ball structures, each solder ball  
4 structure having a curved exterior surface enclosing a first volume and having  
5 an interior cavity having a displacement constituting a second volume, each  
6 solder ball structure attaching one of a plurality of first metal contacts on the  
7 first planar substrate to an associated one of a plurality of second metal  
8 contacts on the second planar substrate.

1           13.    The resilient ball grid array (BGA) electrical and mechanical  
2 attachment means as claimed in claim 12, wherein the first and second planar  
3 substrates are first and second printed circuit boards, respectively.

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1           14.    The resilient ball grid array (BGA) electrical and mechanical  
2 attachment means as claimed in claim 13, wherein the first and second  
3 printed circuit boards are made of organic materials.

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1           15.    The resilient ball grid array (BGA) electrical and mechanical  
2 attachment means as claimed in claim 13, wherein the first and second  
3 printed circuit boards are made of inorganic materials.

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1           16.    The resilient ball grid array (BGA) electrical and mechanical  
2 attachment means as claimed in claim 12, wherein the second volume is not  
3 less than about 1% of the first volume.

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1           17.    The resilient ball grid array (BGA) electrical and mechanical  
2 attachment means as claimed in claim 12, wherein the second volume is not  
3 more than about 90% of the first volume.

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1           18.    The resilient ball grid array (BGA) electrical and mechanical  
2 attachment means as claimed in claim 12, wherein the first and second planar

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- 3 substrates are comprised of one or more materials from the group consisting
- 4 of plastic, ceramic, and epoxy-glass.

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